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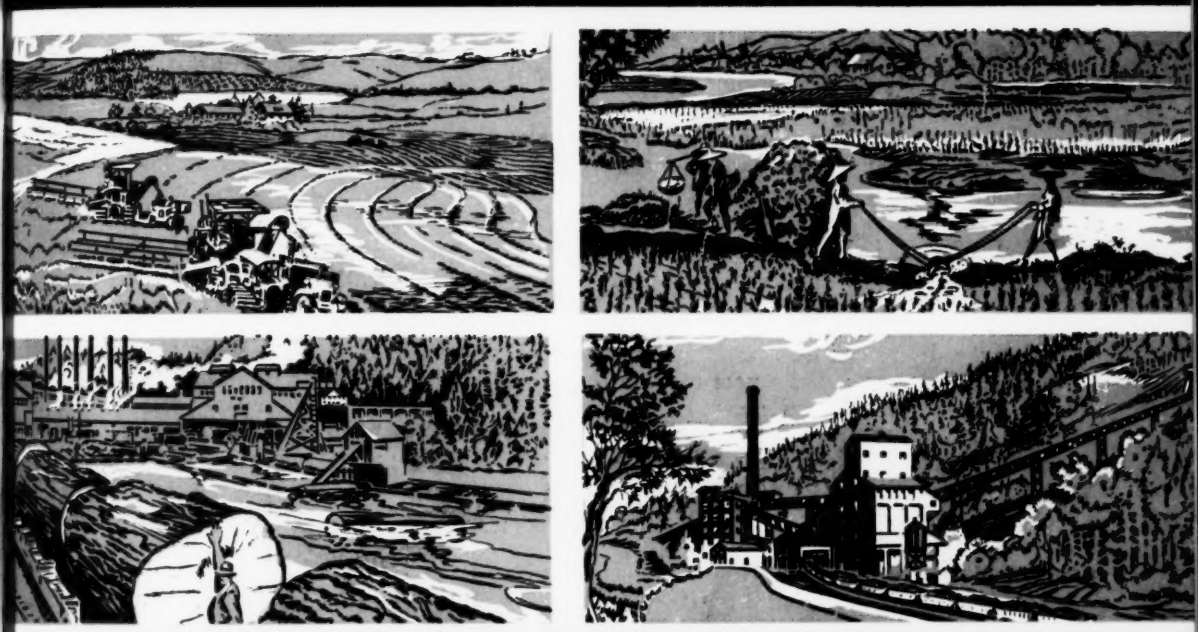

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The JOURNAL *of* GEOGRAPHY

CONTENTS FOR NOVEMBER, 1953

Geography in Relation to the Physical and Social Sciences. By J. Wreford Watson 313

Dr. J. Wreford Watson is Director of the Geographical Branch of the Department of Mines and Technical Surveys, Canada. He also offers classes at Carleton College, Ottawa. As indicated in a footnote, this manuscript first appeared in *La Revue Canadienne de Geographie*, but some slight changes have been made before publication in this issue.

Construction and Operation of a Low Cost, Scientifically Sound Weather Station for the 5th or 6th Grades. By George Stevens and Richard Bell 324

Both Mr. Stevens and Mr. Bell are at the Northern Illinois State Teachers College. Mr. Stevens is Assistant Professor in geography and Mr. Bell is in charge of the Audio Visual Education Office.

A High School Geography Club. By Mary Viola Phillips 331

Miss Phillips is well known for her many activities in the National Council of Geography Teachers and for her many articles written for the high school level.

The Salt Industry of Southwestern Puerto Rico. By Arthur H. Doerr 335

Dr. Doerr is a member of the geography staff, University of Oklahoma. He is well known to the readers of the JOURNAL OF GEOGRAPHY for the articles and book reviews he has contributed to this magazine.

Source Unit for Third Grade Community Geography. By Pauline Schlechty 339

Miss Schlechty teaches at the Southside School, Whiting, Indiana. Her article appeared in the November, 1952 issue of the JOURNAL OF GEOGRAPHY.

Palo Duro Canyon. By Wallace E. McIntyre 348

Dr. Wallace E. McIntyre is Associate Professor of Geography, Illinois State Normal University. He has also taught at the West Texas State College, Canyon, Texas. He spent a year abroad as a Fulbright Professor at the University of the Philippines during 1953.

Geographical Publications 355

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VOLUME LII NOVEMBER 1953 NUMBER 8

GEOGRAPHY IN RELATION TO THE PHYSICAL AND SOCIAL SCIENCES*

J. WREFORD WATSON
Carleton College, Ottawa

Geography has been defined as "the science of space in relation to the earth." Whether geography is all that is debatable, but at least that is all geography. Since space is one of the fundamental dimensions of life, then it is obvious that geography must always be of interest to man.

The discipline had an early start; the ancient world was productive of its cosmogenies and travelogues. Under the Greeks and Egyptians, and particularly under Ptolemy, it even became a systematic, if not scientific, study. The Romans furthered the art of geographical description in various writings about the countries they conquered. But thereafter, geography languished or even lapsed for many centuries.

This was because it did not really pass beyond description to the greater realm of comparison, correlation, classification and explanation. And even as description it did not succeed too well. At its best in Mediaeval times it was a description, to use Chaucer's phrase, of

> "Alle the havenes, as they were
> From Gootland to the Cape of Fynestere."

It did no more than give a sense of where they were. It did not tell them how that affected their lives.

At its worst, description became focused on the bizarre and the spectacular, and geography was often no more than a compendium

* This article by Professor Wreford Watson first appeared in the *Revue Canadienne de Géographie*, organe de la Société de Géographie de Montréal et de l'Institut de Géographie de l'Université de Montréal, Vol. VI, 1952. Since this magazine is not widely distributed within the United States and since we believe the readers would enjoy this presentation of the relationship of geography to the physical and social sciences, we have asked the permission of Professor Watson and Dr. Pierre Dagenais, director of the Institute of Geography to reprint the article, and they have kindly consented.

of all the odd facts about odd people in odd places; altogether an odd subject.

Geography: Art and Science

It was rescued from this by Ritter and Humboldt, the fathers of modern geography who, in the late eighteenth century, tried to make system out of description. They began to co-ordinate different facts, not often thought of together, such as geology and climate, and to show their relationship to each other in the landscape. They developed the description of different countrysides until geography became far more than a gazetteer; until it was an art.

As geography became once more an art, it grew in recognition and in the nineteenth century developed as a university study in France, England, Germany, Italy and the United States. This gave it a great impetus, and geographers tried to explain as much as they could in terms of geography. In fact, this early enthusiasm went too far, and not a few geographers became geographical determinists. They explained the patterns of settlement, development and population in terms of the natural order.

This sort of philosophy can be very easily disposed of by showing examples of difficult environments which have produced a high flowering of culture or well-endowed environments which have produced savages. Moreover, similar natural environments often show quite dissimilar civilizations. Finally, the same environment can be a different thing to different peoples at different times. All that geography does is to condition, it cannot control life.

Nevertheless, even though geography went too far in trying to explain everything in terms of the physical environment, at least the attempt to write an explanatory description developed a scientific interest in and outlook for the subject. Geography became a science as well as an art.

I dare say by this time, that is by the mid-nineteenth century, harassed Deans and Registrars were beginning to face the problem of how geography should be classified. Should it be put in the science faculty or kept in the arts' faculty? Or did it straddle the faculties? And if so, what portions of it could be taken as science courses and what as arts' ones?

The Geographical Dilemma

Geographers themselves differed on these matters. Towards the end of the nineteenth century, men like W. M. Davis of the United

States and Albrecht Penck of Germany thought of geography principally as the science of the natural landscape. Its subject matter was geology, climatology and biology. Geography was, *in the main,* the meeting place of these three sciences.

Other geographers, however, such as Vidal de la Blache of France, Mackinder of Britain and Huntington of the United States, saw geography as a meeting place, rather, of history, economics, politics, anthropology or sociology. They stressed human or social geography, as distinct from physical geography, and while agreeing that geography must have a firm foundation in the physical sciences, believed that its real application was in the field of the social sciences.

Controversy amongst geographers themselves kept the subject in a troubled condition. But that very troubling stimulated a lot of useful discussion. This ranged from one extreme to the other. On the one hand the statement was made that the physical region based upon topography and climate was an irrelevance in geography; an irrelevance because it was man who stamped out the geographical regions upon the earth. (Such differences as did occur from one region to another were far more dependent on man's use and organization of nature than on nature's control of man. Therefore the emphasis in geography should be upon man's adaptation *of* nature, rather than his adaptation *to* it.)

On the other hand the claim was made that the human aspect of the region should be left to the social sciences, and geographers ought to confine themselves to "pure" geography, that is, to the study of the natural aspects of the landscape or the region. It should be enough for the geographer to show how geographical location, bedrock, surface deposits, weather and climate, soil, vegetation and wildlife set their mark upon the landscape. After that it could be left to the historian, economist or sociologist to say what use man had made of his inheritance.

GEOGRAPHICAL CLAIMS OF OTHER SUBJECTS

Before a *via media* was found between these extremes, geography was embarrassed by the claims of other arts and sciences, which seemed to do away with the value, if not the interest, of geography. Nearly all the disciplines with some kind of geographical connotation were producing their own geography; geologists like Salisbury were writing their physiographies; historians like

George Adam Smith were writing historical geography; sociologists like Park were writing their human ecology.

Indeed, Park went so far as to describe his natural areas into which he divided the social complex, on the basis of the moral order. Here was a challenge to the geographer indeed. If geographical distributions, if the geographical outlines of different ecological areas, were to be defined wholly in terms of the moral order, then geography would simply be the effect of sociology in space.

I have, myself, asked the question, "Is geography, therefore, simply the spatial factor in other disciplines, and if so, could it not be attended to by them when they come up against it?"

No geographer would be happy to answer in the affirmative, just as no historian would be willing to yield up the study of the time factor to any and every subject. These factors of space and time require special study in themselves. I think that probably the interested disciplines would admit that. Thus the economist who is interested in economic history is probably glad to have all the help he can get from the professional historian because the historian can supply him with data on political history, social history, biography and so forth, with which to weigh the economic history. Similarly the economist who is interested in economic geography does not, on that account, want to learn all about the evolution of landforms, the dynamics of weather, the habits of plants and animals and their adaptation to each other and to the physical environment; he does not, on that account, wish to study the geography of race, language, religion and population. He is glad to accept what is relevant from all this mass of knowledge and leave the rest to the geographer.

THE GEOGRAPHER'S SPECIALTY

Geographers then cannot give the space factor up to other disciplines. This is their special study. They cannot leave the physical aspects of the study to the geologist, glaciologist, meteorologist, climatologist, botanist or zoologist, altho each of these may wish to study the geographical setting of their particular problems; nor can geographers leave human geography to the anthropologist, economist, historian and sociologist.

It is their special task to treat the geographical factor as a whole; a factor which others can only treat in part. That is why they are needed. Because no one else makes it his business to treat

the geographical factor as a whole, with its immense ramifications thruout the physical and social sciences. Geographers take up the geographical aspect of each of a dozen other sciences and make that a science in itself by relating one aspect to the other and obtaining the picture as a whole.

When they do so they realize that it is absurd to talk about pure geography as being the study of the physical environment, or to say that the physical environment is irrelevant to geography. When they see the geographic factor as a whole they realize that it has both its physical and its social components and that it is therefore quite unscientific to ignore one of these components or to emphasize one above the other.

This needs to be stressed in newer countries where the study of geography, *per se,* is relatively recent. Here older established subjects have been inclined to write their own geography. Consequently there has been the danger of considering *their* part of geography as being the whole. But if the geographer is to serve the legitimate interests of other subjects he can surely do this best of all in an independent position, where he may look at the discipline as a whole. Otherwise the geography that is taught tends to become associated with the main interests of the department in which it is given. If taught under one of the social sciences, it tends to stress human geography at the expense of physical geography and vice versa.

The problem is a particularly pressing one in the schools where the teaching of geography is often assigned to teachers who are not specialists in geography and who, therefore, frequently give it their own special slant. To assign geography in this way raises again all the old arguments as to whether it is a social or a physical science. For instance, I have heard it argued in some schools that geography should be taught by science masters because in its pure form it is more closely related to chemistry, physics and biology than to history. On the opposite side there are the protagonists of social studies, now very much in the saddle, who wish to see geography and history dissolve themselves together in order to make a new concoction for the schoolboy's palate.

GEOGRAPHY AS A WHOLE

If when geography is taught by the science master the human aspects are left out or minimized, or if, when taught by the social

studies' specialist the physical basis of geography is ignored, then geography as a whole will suffer. Not only geography, but the physical and social sciences themselves. We are very much in need of some form of correlation between the physical and social sciences. Professor Barnes, in one of his stimulating books, describes civilization as a streamlined machine with stone age man at the controls. No doubt this is an exaggeration, but it points up what all of us know to be a problem; the dichotomy between the physical and social sciences.

Geography is one of several means by which this can be overcome for it trains the individual habitually to reason in terms of both great categories of thought. He does this in relation to each of the several facets of earth and man which he analyses.

Take, for example, the facet of *distance*. This is one of the most important influences in creating geographical patterns. It helps to decide whether a place is accessible or isolated; whether resources can be feasibly developed or not; etc.

At the very outset the geographer learns that the geographic effects of distance, such as accessibility, isolation and communication, do not vary alone with linear measurement, that is, with a property of physical science. Of two points which are equidistant from a third, one may be much more accessible than the other because the road to it lies over a plain rather than over a mountain; or over a well-drained plain rather than a swampy one; or over an open, grassy plain rather than a heavily forested one. Topography, drainage, vegetation cover all qualify linear distance. But what does not? Different intensities of agricultural development, the sparsity or density of settlement, the way in which the land is surveyed and divided out, the presence of political frontiers, the psychological reaction to the use of a route because of religious or ethnic prejudice, all these may have to be taken into account by the geographer in explaining why one of the two equidistant places is so much more accessible to the third and therefore why its geography is so closely linked with the third point.

In other words, *linear* distance is qualified by other types of distance. It is qualified, for example, by *cost* distance, which itself depends upon slope, drainage, cover, use of the land, the economy of the area, its technology and so on. More than that, linear distance is qualified by *social* distance. You can bring two entirely different social levels very close to each other and yet find them as

much divided as if immense stretches of linear distance lay between them, so their mere nearness means nothing to the geography of their different needs and habits; to the geography of their houses, occupations and recreations.

The connection between these many things is, for the geographer, the effect of distance on the particular geographical distribution he is tracing. When one recalls he also has to study the effect of bedrock, vegetation cover, the economy, the society and all the other facets of the environment, each in relation to the other, one sees that his is a highly specialized task which requires some knowledge of both the physical and the social sciences. He cannot afford to be one-sided without distorting the whole picture. He must, in Arnold's phrase, "See life steadily and see it whole."

Geography and Other Disciplines

That is not to say, of course, that geography is merely an encyclopaedia of the sciences. For one thing its day to day working relationships are with only a few of them; with geology, physics and botany, with history, economics and sociology. It touches other subjects only now and again.

For another thing it touches these subjects only at small sectors of their total circle of interests. An example is its concern with rock types as major factors underlying various geographical distribution, bringing acquaintance with petrography; but as for crystallography, it need only have a relatively superficial knowledge of it. Its concern with the distribution of mineral resources as another major factor in geographical distribution makes some knowledge of mineralogy advisable, but it is not so concerned, as geology is, with the processes which have developed the various minerals. There are aspects of geology about which it must know a lot, such as geomorphology and glaciography, but other aspects into which it need not enquire very far, such as palaeontology.

Similarly, its concern with vegetation, whether as an indication of climate or whether as a factor in settlement and the use of land, is far more with plant ecology than physiology.

As for economics, I suppose its chief interest is in the economic distinction between optimum and marginal production and in the economist's opinion as to when a resource becomes economically usable or what are the economic opportunities and limits to agriculture, industry, commerce, transportation and communication.

One obvious example of this is the need to estimate the geographical possibilities of settlement in the continental northland. Some ill-defined geography has attempted an estimate based on physical geography alone; but actually physical geography, tho important, is probably not as significant in this case as economics or sociology. Consequently when the geographer tries to make a fair estimate, he must take into account the economic and social factors involved, because these are the ones likely to have the most say in the final geography of northern settlement.

In other words, the geographer is interested in other disciplines to the extent to which they can help him record the geographical distributions of things, and explain them, if they can be explained, in relation to the total environment. And, altho it would be fortunate for him if he knew more about these subjects than what is of immediate use to him, to know for example the theories of economic cycles, of money and banking, of capital and labor, of international trade, or what have you; altho it would be nice to know how plant physiology is related to plant ecology; or how crystallography is related to petrography: he has not the time, even if he were to have the inclination, to learn all this; he must accept it from the experts.

Thus if for reasons of fiscal policy, banking structure, capital, labor, tariffs or any other economic matter, the consensus of opinion among economists is that a certain type of resource is not economically accessible, the geographer has to accept this. What he is interested in is the effects of accessibility on his geographical distributions. To this end he may compare the economic accessibility with social and physical accessibility and weigh one against another; but he cannot go into *all* the whys and wherefores behind the fact of accessibility itself.

THE GEOGRAPHER: MASTER JACK

Occasionally the criticism is raised that because the geographer knows only those sectors of other disciplines in which he is interested, he is of no use to them; he is a jack of all trades, and master of none. But in a sense there is a need to be a master jack. Each trade is so highly specialized that disciplines are needed to study factors common to all of them. And in a sense this is what the geographer does. He specializes in generalization; in seeing to what extent anything is affected by or affects the earth factor.

Nor is this only of academic interest. There are many practical ways in which this kind of outlook can be put to good use; in land-use surveys; in conservation surveys; in town and regional planning; in industrial development and the defence of the country. Geography has a very practical contribution to make to the public welfare in each of these several fields.

As a result of all this, geography is drawing the lines of its sphere of interest more closely and firmly. It has developed a body of knowledge; a method of approach; and a technique of activity.

THE BODY OF GEOGRAPHICAL KNOWLEDGE

The body of geographical knowledge includes both physical and human geography. As the physical environment is the ultimate framework for human action, so physical geography must be the basis on which social geography is built. It makes explicit what Maurice Le Launon, in his study of Brittany, calls the "suggestions of nature" to man: suggestions which, if man takes heed of them, will help him to make the most of his society.

Physical geography is of the greatest value to the geographer in making him more exact, more concrete and more disciplined in his observations, analyses and conclusions and thus in helping him to maintain a scientific approach and use a scientific technique in his work.

Physical geography begins with astronomy and mathematics in the location of geographic features by latitude and longitude and their representation on maps of various projections and scales. All this provides the geographer with knowledge of position, distance, size, shape and area, which are the first (and sometimes the most important) aspects of a region or place.

Physical geography continues with rock types and structures, the occurrence of economic minerals and fuels, the relief of the land and the nature of surface deposits and kinds of drainage, since each of these aspects of geology has an acute bearing on the geographical distribution of plants, animals and man.

Physical geography uses some knowledge of physics in describing the weather systems of the world and the distribution of climate.

It draws on botany and zoology to define the great life zones of the world and note how they are related to climate, relief, rock type and position.

Climate and vegetation, together with rock material, influence the nature and distribution of the soil zones of the world and these are an important influence, in their turn, on all sorts of geographical distributions.

While physical geography is, and should be, a fundamental part of the subject the main thing about geography is that it has something to say on human affairs. Consequently, human geography must be given a strong representation in any geographical report or in any curriculum. This is true not simply because we humans are bound to be most interested in ourselves, but because we have made such a profound impression on the earth that we have changed and are changing its geography on a very wide scale. Except for the very cold and very arid lands, man has made the rest of the world as Vidal de la Blache said, a medal struck in the likeness of the people. He has minimized the initial effects of distance, overcome topographical barriers, wiped out certain species of life and made others dominant in their place, and everywhere has set his imprint on the landscape. Indeed the term "cultural" landscape has been coined of the landscape so modified by man. If then, as physical geographers are prone to say, geography is the study of the landscape, it must, for that reason, be the study of man. There are very few landscapes that man has not altered.

The body of knowledge in human geography is somewhat more amorphous than that in physical geography. Usually it includes sections on anthropo-geography, or the distribution of races; cultural geography, or the distribution of languages and religions; economic geography, or the distribution of resources and occupations; social geography, or the distribution of settlement and population; and political geography, or the distribution of political entities. Historical geography includes all of these in the history of human development of any area. It is the *changing* cultural landscape as new people, ideas, economies and political systems change the geography of the land.

THE GEOGRAPHICAL METHOD OF APPROACH

The method of approach used by geographers in general is to analyze and record the distribution of each aspect of physical and human geography in turn; to see if there is any relationship between the various distributional patterns present; and, if there is, to trace the connections between them showing how one affects the

other; and, finally, to describe the resulting complexes as typical landscapes or regions which, when pieced together, form the world as it is. Examining how one force exerts its influence on another, geography is particularly well placed to show the influence of the environment on man and his adjustment to it. Carried to practical ends in the adjustment of occupation and settlement to the land, geography can do much to guide and serve public affairs.

GEOGRAPHICAL TECHNIQUES

The principal techniques which geography uses are field surveys, the interpretation of aerial photographs and the making and reading of maps. Geography has a practical base. It examines its data in the laboratory of the field. This is where the fundamental material is gathered; by first-hand observation of the landscape itself. Without this it would be difficult to perceive any geographical patterns, to substantiate any conclusions or to draw up any principles. It is true that schoolroom geography obtains its picture of the world without this aid; but that is only because explorers, observers and scientists have made and are making constant checks in the field. But even schoolroom geography would immeasurably benefit by field excursions of various kinds.

Almost as useful, however, as going into the field is the examination of aerial photography. Here one has the field laid out on the draughting table, and skilful interpretation can reveal the many geographical patterns and relationships which exist in the area photographed.

The data gathered by field experience and photo-interpretation are put on a map. This close tie between geography and the map does probably more than anything else to keep geography an exact science; because the map is a very exacting thing; it cannot hide vagueness of thought or expression: it demands clarity.

So close is the relationship of geography to maps that it might be averred, "that is not geography which cannot be mapped." Even if this is exaggerated it underlines the geographer's intimate connection with cartography. He must know his maps, or he is no geographer. As Professor Chabot states, "As long as geography remains the science of the space factor, it must remain a map science, for the best way of showing the factors of space is to map them."

CONSTRUCTION AND OPERATION OF A LOW COST, SCIENTIFICALLY SOUND WEATHER STATION FOR THE 5TH OR 6TH GRADES

GEORGE STEVENS AND RICHARD BELL
Northern Illinois State Teachers College, DeKalb

NOTE TO TEACHER

The following instructions are for the construction and operation of a low-cost scientifically-sound elementary weather station as an interest corner in the 5th or 6th grade classroom. The material cost should be well within $1.00, for most of the materials can be brought from home. Instrument photos and construction procedure are self-explanatory. Adult participation in the construction of the instruments will not be necessary. The student committee actually doing the construction should be relatively small for here, as in many other such projects, too many cooks could spoil the broth. Others can help collect the construction and operation materials and share in the daily reading and recording duties when the station is ready for use.

Your own background reading and the students' further interest in the subject of weather and weather forecasting can be obtained from *Everyday Weather and How It Works* by Herman Schneider, McGraw-Hill Book Company, New York. The book sells for $2.75 and should be obtained for your school library regardless of a plan to develop this particular interest corner. Your personal interest in the project and its operational success will be your greatest contribution and will be quite effortless, despite any possible fear of things scientific that you might possess.

Accuracy of the instruments, tho not professionally suitable, will be relatively good. Trends and changes in pressure, wind, humidity, temperature and thus weather will be clearly indicated. An understanding of the principles of forecasting weather will follow with use.

MATERIALS NEEDED IN CONSTRUCTION

You can easily build a weather station of your own. The instruments will not be extremely accurate, like the ones at the Weather Bureau that cost hundreds of dollars, but they are fun to build and will give you fairly good results.

The instruments for this weather station can be built with a

hammer, tin snips, coping saw, small drill and a knife. You can find most of the materials in your home. The tools vary, depending upon durability of construction, and the above list is for the instruments pictured.

WET-AND-DRY BULB HYGROMETER

A wet-and-dry bulb hygrometer is one type of hygrometer. Construction will require the purchase of two thermometers.

The materials needed for this hygrometer besides the two thermometers are a piece of wide white cotton shoelace and a small water container. In Fig. 1, a washed out empty ink bottle was used. Remember when you purchase your two thermometers (five-and-ten-cent store ones should do) to get two that read as nearly alike as possible. Boil the piece of shoelace for a few minutes to wash out any chemicals that may be in it. The two thermometers can be hung on the wall or mounted as shown on a piece of board. One end of the shoelace is slipped around the bulb of one of the thermometers, the other end into your water container. Your instrument is finished and ready for use. A Table of Relative Humidity is necessary for using this instrument and may be found on page 139 of *Everyday Weather and How It Works* or in most elementary texts on the subject.

RAIN GAUGE

The rain gauge measures the amount of rainfall. Any open container with straight sides can be used for measuring rainfall. You simply measure with a ruler, zero end down. The trouble with this method is that an ordinary rainfall is considerably less than an inch (a light shower may be only a fiftieth of an inch), thus we must magnify the reading.

The materials needed are again simple, consisting of a box frame (Fig. 1), a pointed paper cup or plastic or metal funnel and a small straight sided jar. In Fig. 1 an olive bottle and metal five-and-ten-cent store funnel are used. The plastic or metal funnel is highly recommended over the paper cup because of its greater durability. Paper for a scale alongside the bottle and scotch tape or cement to fasten the scale completes the list of necessities. Assemblage of materials is clearly illustrated by the photo (Fig. 1), but one critical item must be watched—the marking of your scale. In Fig. 1, the wide diameter of the funnel (rain catching area) is

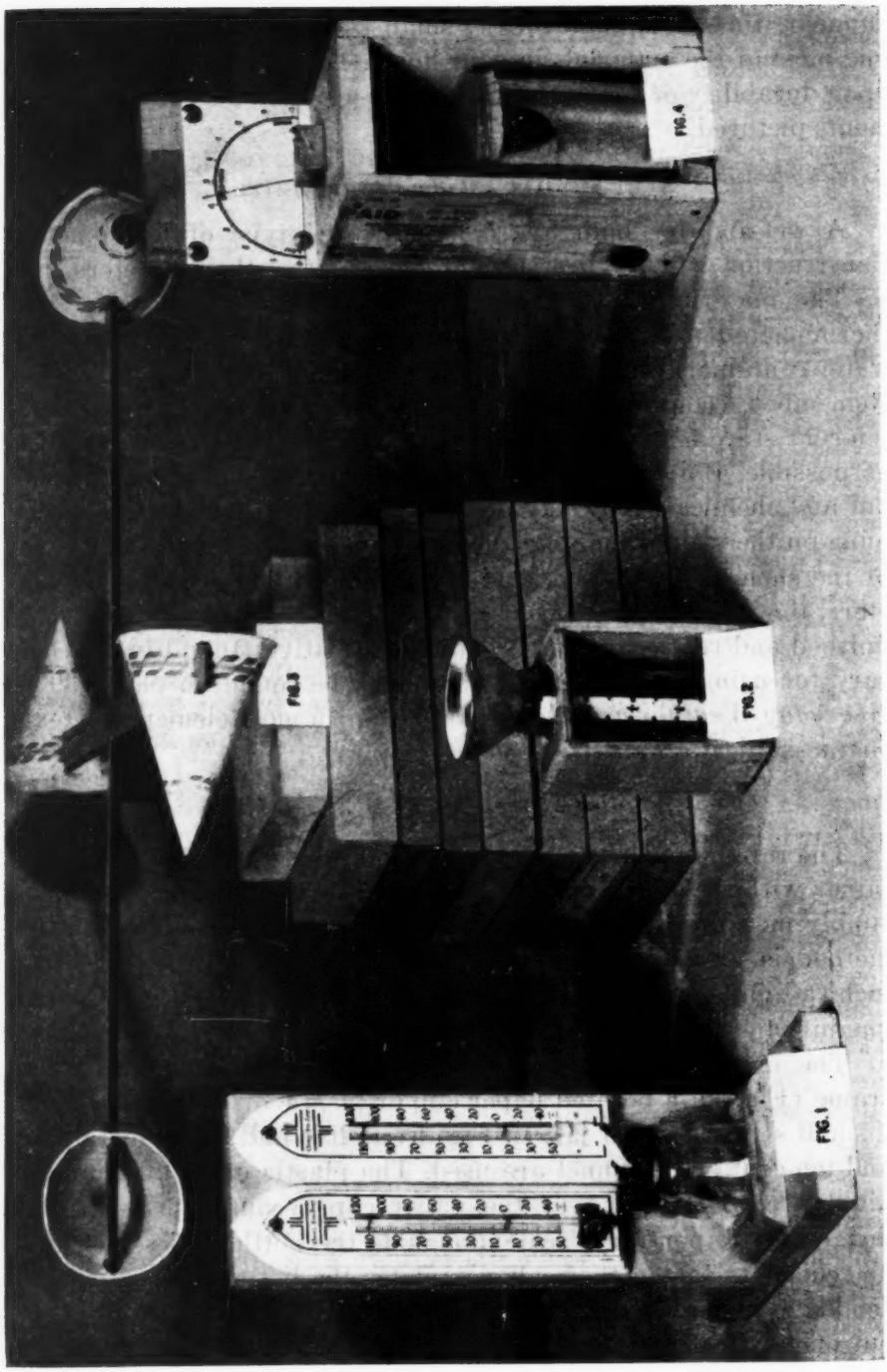

FIG. 1. Weather Instruments

2.5 inches while the diameter of the olive bottle is 1.25 inches. A ratio of two to one between funnel diameter and straight-sided bottle thus means a scale marking four inches high on bottle equivalent to one inch of rain. Subdivisions can easily be made on this magnified scale. A one-inch high marking equals one-fourth inches of rain, a two inch high marking, one-half inches of rain, and so on.

ANEMOMETER

An anemometer (an-e-mom' e-ter) (wind speed indicator) is the most recognizable instrument of any weather station.

Construction materials are highly variable. The instrument in Fig. 1 is a 4-cup type. The arms from the pivot point to the cups here are wood slats. The wind catching surfaces secured to the ends of the arms are pointed paper cups. All arms should be the same length and all cups the same size. In Fig. 1 the pivot point is a block of wood with a hole drilled thru it the size of a heavy nail, well sharpened to turn freely, and with one end of the hole closed over with a piece of tin sheeting which acts as a bearing surface. The main item here to remember is that the pivot point is free wheeling.

FIG. 1. Weather Instruments

BAROMETER

The barometer (ba-rom' e-ter) is probably the most useful of all instruments. It tells the pressure of the air—how heavy it presses. Cold air presses more heavily or has more pressure than warm air, thus an increase in pressure generally indicates the coming of weather that is cooler—and drier. It is drier because cold air holds less water vapor than warm air.

Fairly good results can be had with a homemade barometer constructed out of scrap materials. You will need a wood box or a heavy carton as a base unit, an empty tin can small enough to fit into the box, a small piece of rubber sheeting of toy balloon thickness, a needle, thread, glue or cement, broom straw, a white card for a scale, scotch tape, paper match and two pennies.

Cut a circle of your rubber sheeting about two inches larger than the bottom of the tin can and cover the open end, neatly and smoothly. Fasten its edges to the side of the can with a few rubber bands. It is important that the sheet is fastened securely. In Fig. 1 a hole was made in the top side of the box and a needle mounting set up over the hole as shown, so that the needle, turning freely

in its mounting, has its eye towards the back side of the box. The needle eye holds the broom straw about three inches long. Cement it securely. This is your dial for the scale card indicating changes in pressure. Cut a piece of thread about 10 inches long. Tie one end around a small piece of paper match. Then attach the piece of match with cement or glue to the center of the sheeting on the can. Taking the other end of the thread thru the hole, wind it around the needle—over from the right side, twice around and over the edge of the box. Tie the loose end with scotch tape to the two pennies. Their weight will keep the thread taut. Set your broom straw to "Medium" on your scale card and let the air pressure do the rest. Your instrument is ready for use.

THE OPERATION OF THE WEATHER STATION

To get the best results from your weather station, make a record of your observations twice a day. A suggested form for keeping your station record is shown in Fig. 2. After a few days you will begin to see a "cause and effect" relationship. You will see that today's weather is a result of what took place yesterday and the day before. Yesterday and today's weather in the same way are making tomorrow's weather. Your constructed weather station

Weather Observations Chart

Date	Time	Barometer Reading	↑→↓	Temp.	Humidity	Rain	Wind Direction	Speed	Sky	Forecast

How to Use the Chart:

Take your readings at about the same time every day.

Arrow symbols next to the barometer reading column refer to rising, steady, and falling air pressure.

Winds are named by the direction from whence they come.

The wind speed can be determined with your anemometer.

In the sky column, use these symbols: ○ Clear, ◑ Partly Cloudy, ● Cloudy.

FIG. 2. Weather Observation Chart

will give you some advance information. A comparison of your own instrument information with the weather forecast in your local newspaper will be useful in understanding weather.

What should we look for in the instruments? Why do they work as they do? These are the questions we must answer to operate our station.

The wet-and-dry bulb hygrometer will show the humidity of the air.

The plain thermometer tells the actual temperature of the air. The other thermometer, moistened by the wet shoelace, reads cooler, because it is being cooled by evaporation of water from the shoelace. The dryer the air, the more rapid the evaporation, and thus the more cooling taking place. If the air were completely saturated, no water could evaporate from the wet shoelace, and the thermometers' readings would be the same.

Your wet-and-dry-bulb hygrometer, when used with a Table of Relative Humidity will tell you the relative humidity in per cent. Mark down the temperature of the dry-bulb thermometer first. Then fan the wet-bulb thermometer for about 30 seconds and mark down its temperature. The reference for obtaining a Table of Relative Humidity will also explain how to use the two different temperature readings to acquire a relative humidity figure in per cent. If this per cent figure is low, the air is dry, if it is high, the air is moist.

In the summer when windows are open, you can keep your hygrometer indoors. When windows are closed, you'll have to keep your hygrometer in a protected place outdoors and out of the sunlight. You will find that the humidity of the air increases before a rain and decreases afterward. When a front is approaching, the humidity will go thru the following pattern of change.

	Before Front	During Front	After Front
Warm Front	Increasing	Very Moist	Slight Decrease
Cold Front	Steady	Very Moist	Rapid Decrease

The rain gauge measures the amount of rainfall. You simply record the amount on your scale following a rainfall. On your magnified gauge, you can record small fractions of one inch.

Your anemometer will measure the speed of the wind. When the wind blows, it skims by the outside of each cup but is caught inside the cup, causing the whole thing to turn. The faster the wind blows, the faster the anemometer turns. Mark one of the four cups with

crayon or ink to distinguish it from the others. Then you are ready to count the revolutions and determine the wind speed.

One way to find the wind speed is to count the number of turns in 30 seconds with a watch that has a second hand and divide this number by five. This will give you the wind speed in miles per hour.

Mount your anemometer outside on a post or on the roof. Be sure it is in the open where the wind can blow against it. It will be interesting to compare your readings with the Beaufort Scale. You will find one in *Everyday Weather and How It Works* on page 153 or in most elementary texts on weather. This scale was devised back in the days of sailing ships by an English admiral named Beaufort. Your wind-speed numbers will fall somewhere in the range of speeds on the Beaufort Scale which gives other characteristics of such wind speed.

Your last instrument, the barometer, will be highly useful. It works as follows. The molecules of air in the can bounce around in all directions with those near the top bouncing against the rubber sheeting. This would make the sheet bulge upward if it were not for other molecules of air over the sheet pushing downward. However, when the outside air becomes heavier and presses harder, the sheet is pushed down a bit. When the outside air becomes weak, the sheet is pushed up slightly by the air inside. These movements of the sheet cause the thread to move up or down, the needle to turn and the broom straw pointer to move.

Your barometer, if carefully built, will be moderately sensitive to changes in air pressure. The rubber sheeting must be airtight to keep it sensitive. Don't expect to see rapid motions of the pointer—an approaching front may move the pointer a fraction of an inch in a day. You can't tell anything about the coming weather by just one look at the barometer. Look at it, make a notation of the amount, and then check it again hours later or the following day to note any change. This way you can tell whether the pressure is rising or falling and whether the approaching air mass is cold and heavy, or warm and light. Your barometer will be sensitive to temperature changes. Thus, for maximum accuracy, keep your barometer in a place where the temperature changes as little as possible.

A HIGH SCHOOL GEOGRAPHY CLUB

MARY VIOLA PHILLIPS
New Kensington High School

Clubs of various kinds are stimulating considerable educational growth in many schools. During the school year 1944-45 a Geography Club was organized in the New Kensington Senior High School. The object of the club is to foster and increase interest in geography and to promote a better understanding of the peoples of the world. All seniors, who are members of the Global (World) Geography classes, are eligible for membership. The members of the club are also junior members of the Geography Club of Western Pennsylvania and are affiliated with the Pennsylvania Council of Geography Teachers.

Since the club was organized its members have participated in many activities—local, state, national and international. Participation in these club activities have made for a greater understanding of the problems of others, an increased interest in civic affairs and the development of a spirit of unselfish service. Here are some of the major activities that the club members have had an opportunity to create, direct and produce:

ACTIVITIES AT LOCAL LEVEL

1. Each year the club members write their own radio script and present a half hour broadcast over the local radio station WKPA. The programs have covered such topics as "Our Neighbors to the South," "World Geography in the Senior High School," "A Geography Course of Study for Grades 7 to 12" and "Geography Today."
2. The students constructed a map of New Kensington, with points of interest marked by actual photographs. It was displayed in the downtown section of the city during Pennsylvania Week.
3. During the fiftieth anniversary of the New Kensington High School the club members built a prize-winning float for use in the school and community pageant. The theme around which the float was constructed was "Peace and Security Thru World Understanding."
4. The club members have charge of the visual aid equipment

used in the geography classes. They preview the film strips and movies before presenting them to the classes.

5. Once a year an exhibit of geographic materials, collected and prepared by the students, is displayed in the geography classroom. All classes within the school are invited to visit the exhibit.
6. Speeches and illustrated lectures given by exchange teachers, laymen and others are greatly enjoyed by the club members.
7. Current happenings and live geographic questions are sometimes discussed at the regular meetings of the club.
8. Pictures and newspaper clippings recording the history and activities of the Geography Club are kept in an attractive record book.
9. Last year the Geography Club published a nine page Bulletin. We believe that it is the first of its kind to be published by students at the senior high school level. The material for the bulletin was compiled, edited and mimeographed by the club members.
10. For the past two years the club has arranged a trip to the Buhl Planetarium in Pittsburgh, Pennsylvania. This year, three bus loads of students from the World Geography, Geography of the Americas and Commercial Geography classes went on the trip. On the day following we discussed what we had seen and done and wrote it up in the form of an experience chart.

ACTIVITIES AT STATE LEVEL

1. During the past two years the club members have been active participants in the Geography Shows that have been held at the Buhl Planetarium in Pittsburgh, Pennsylvania. They prepared and entered numerous class projects, (individual group), such as maps, pictures, posters and notebooks (See Photograph).
2. A number of our talented members have appeared on programs at meetings of the Geography Club of Western Pennsylvania.
3. The Club sent copies of their first Bulletin to every school Superintendent in the State of Pennsylvania and extended

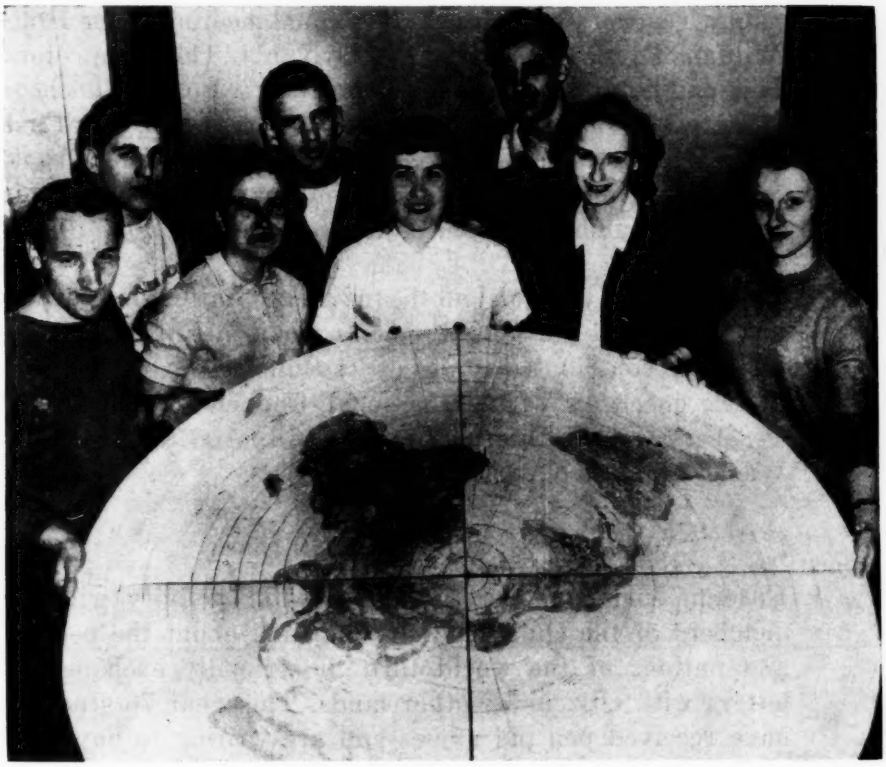

FIG. 1. The photograph above first appeared in *The Kentonian* (the New Kensington High School newspaper) and carried the following caption:

Geographers Pack Entries for Contest—Front row (left to right)—Joe Mangone, Lois Jean Fox, Shirley Anchors, Betsy Yetter, Joan Patterson. Back row—Ralph Buffone, Bob Lecocq, Louis Wasylik. The photo was taken by Bill Miller, an active (twelfth) grade student in the high school who plans photography as a career.

an invitation to the students within their schools to form similar clubs.

4. Several members are now serving on a Program Exchange Committee of the Pennsylvania Council of Geography Teachers. As members of this committee, they collect information and data concerning the activities of Clubs, Councils and Study Groups in the various parts of the State. These data are being filed in an attractive record book.

ACTIVITIES AT NATIONAL LEVEL

1. The members of the Geography Club made table markers for the luncheon and dinner of the National Council of Geog-

raphy Teachers when it held its annual meeting in the Hotel William Penn, Pittsburgh, Pennsylvania. The state colors, blue and gold, were used for the markers. For the luncheon "interest group" markers such as Conservation, Far East, Near East, Latin America, etc., were made with a blue background and gold letters. Blue cut out maps of Pennsylvania with gold numbers served as table markers for the dinner meeting.

2. The officers of the club had the privilege of attending several meetings of the National Council when it met in Pittsburgh.
3. The Club contributed copies of its Bulletin for distribution at the meetings of the National Council of Geography Teachers and the International Geographical Union held in Washington, D.C. August, 1952.

ACTIVITIES AT INTERNATIONAL LEVEL

1. Foreign correspondence is the popular activity with all members of the club. They are learning about the peoples and nations of the world thru the friendly exchange of letters with citizens of other lands. This year 76 students have received pen pal names and are writing to boys and girls living in distant parts of the world. The students have found international correspondence to be an interesting hobby as well as very educational. Many of the letters are brought to class and read to the group and therefore, their letters are enjoyed by many. These letters help to sharpen interest in young people beyond the seas and push ahead the frontiers of international understanding. Ambassadors of good will are so desperately needed in the universal struggle for good international relations.
2. The Club has also helped to spread our "International Good Will" by sending Care packages to needy families in Europe.
3. This year the students of Ken Hi are collecting money to bring a teen age girl from Europe to attend our high school next year. The members of the Geography Club are contributing funds toward this project.

These and many other club activities have not only helped to vitalize our classroom work, but they have helped the students

attain the feeling of participation and of successful achievement.

The members of the New Kensington Geography Club would like to invite the geography students in the secondary schools of our state and nation to organize similar Geography Clubs.

THE SALT INDUSTRY OF SOUTHWESTERN PUERTO RICO

ARTHUR H. DOERR
University of Oklahoma

Salt has been a staple necessary for thousands of years. Where salt can not be readily obtained, it is almost always an article of trade between producing and non-producing areas. People of salt deficient regions which are bounded by the sea, have generally looked to the sea for a salt source. In humid coastal areas where sufficient fuel is available, salt is evaporated by boiling sea water. In seaside arid or semiarid areas, which have suitable topography

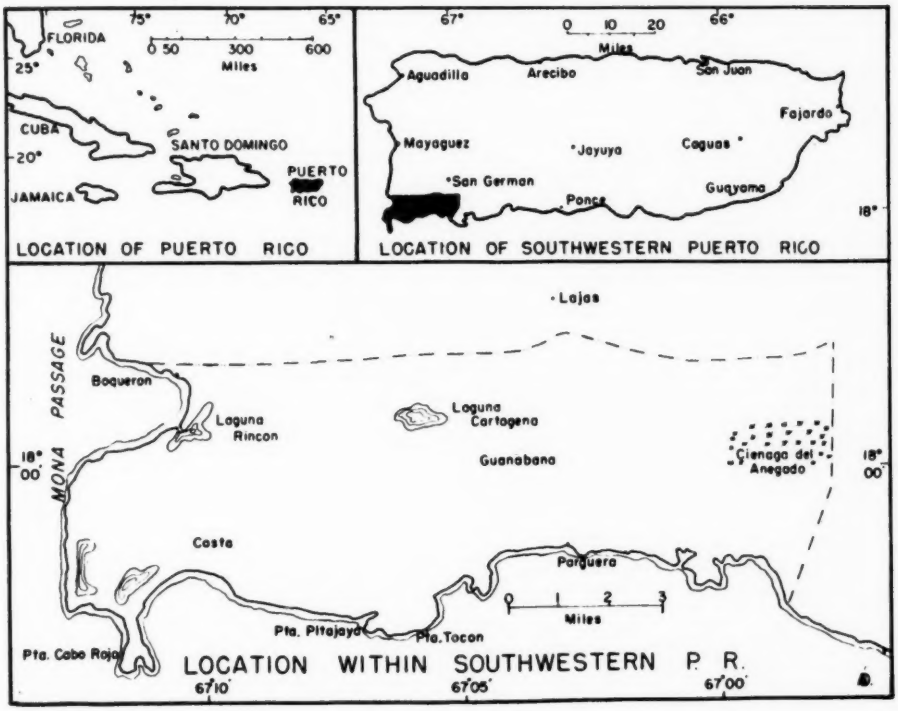

FIG. 1.

and soils, salt is evaporated from sea water by the heat of the sun. Only in such a semiarid or arid environment with its low relative humidities, large amounts of sunshine and high evaporation rates is it practical to produce salt from sea water by open pan evaporation methods.[1] Semiarid southwestern Puerto Rico is such an open pan salt producing area (Fig. 1).

Manufacture of salt from sea water has been going on for a long time in southwestern Puerto Rico. At least one of the pans has been in operation for 75 years, and several others for more than 60 years. At the present time there are eight producing pans (Fig. 2). These eight pans and others nearby along the south coast account for all of Puerto Rico's salt production. The eight pans in the southwestern part supply about 77 per cent of the island's salt production and about 74 per cent of the total salt consumption. These eight pans produce about 12 times as much salt as the total annual salt importation of 1,200 tons.[2]

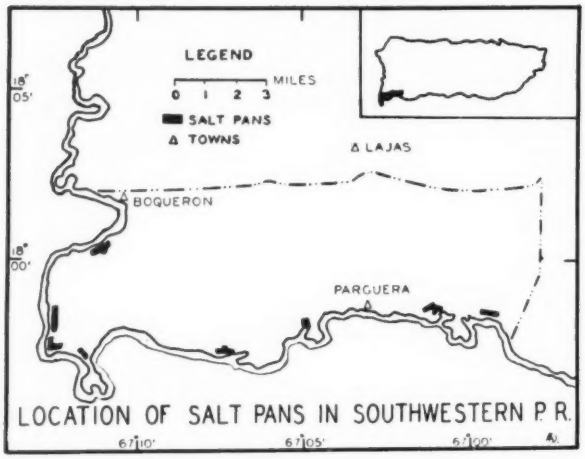

FIG. 2.

The salt manufacturing process is relatively simple. Sea water is pumped into shallow earthen pans which have impermeable soil bottoms and are generally about an acre in size. One salt manufacturing establishment may have numbers of individual acre-size pans. The sea water is pumped by gasoline engines, altho in the early days the pumping was done by windmills. A pan located about two miles west of Parguera is so advantageously located that high tides will fill the pans when a simple flood gate is opened. The physical layout of one of the larger salt pans is shown in Fig. 3.

[1] The term pan may refer to one of the shallow earthen depressions which holds the sea water while evaporation is in progress, or it may be used in reference to the entire salt manufacturing establishment.

[2] Jose Garcia Abreu, *Survey of Southwestern Puerto Rico* (Mimeographed Report, 1943), 2.

The salt pans are filled to depths varying from seven to 12 inches, and the water evaporates in from 15 to 30 days. The salt may be collected from four to nine times per year depending on the location of the pans and the amount of precipitation. Obviously more salt can be collected in the drier sections of southwestern Puerto Rico, and more is collected in dry years than in wet years. In 1941, when the precipitation was about 20 inches along the south coast, salt production from seven pans was 12,370 tons (the eighth pan was not yet in existence), whereas in 1949, when the precipitation averaged about 35 inches along the south coast, production for eight pans was less than 12,000 tons.

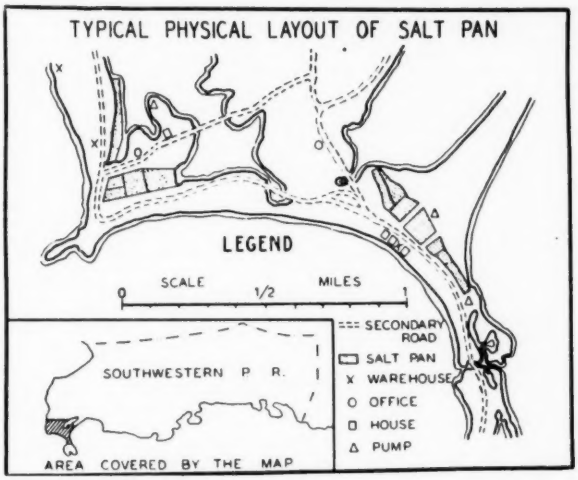

FIG. 3.

The salt is collected by men with shovels and wheelbarrows (Fig. 4). These men are paid on different bases and earn widely divergent wages. Some of the laborers work on a piece work basis, while others receive a regular hourly wage. Usually the highest wages are paid in the most inaccessible pans. Wages vary from $1.50 to $7 per eight hour day. The average labor force at each establishment varies from six to twelve in number, but some of the laborers work only part time.

The present annual average salt production in southwestern Puerto Rico is about 15,000 tons, which at 1950 prices of from $8 to $12 per ton has a maximum cash value of about $165,000. With few exceptions the salt is sold on a strict cash and carry basis. The buyers bring trucks to the pans, load the salt and haul it away. One pan located just west of the town of Parguera, which has been in operation for only three years, is an exception to this general rule. The operator of this pan delivers his entire output to the large cement plant located at Ponce, where the salt is used in the manufacturing process. The salt thus used is generally impure, and as

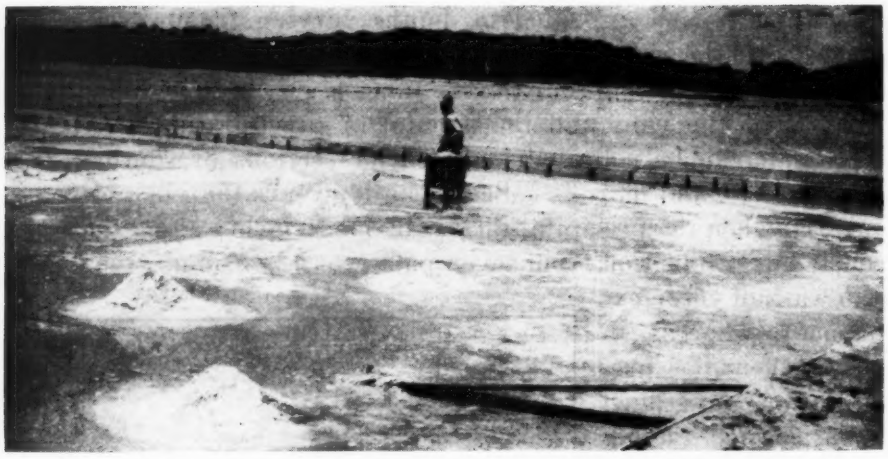

FIG. 4. Laborer collecting salt with wheelbarrow and shovel in one of the salt pans along the south coast of southwestern Puerto Rico.

a result does not command as high a price as do the better grades produced in other pans.

Salt that is awaiting sale is usually piled outdoors, altho a minor fraction is kept in warehouses. The low incidence of rainfall precludes the loss of much of the salt, which is stored outside (Fig. 5). The amount of salt which is dissolved by the rain is not usually enough to justify the construction and maintenance of storage warehouses, altho some of the larger pan owners have constructed cheap warehouses.

The salt industry is at present rather small and dispersed, but a number of factors favor a greater number of salt pans and an increasing salt production. Among the most important of these factors is the expanding market. Increasing populations, both human and animal, are making larger salt demands annually. In

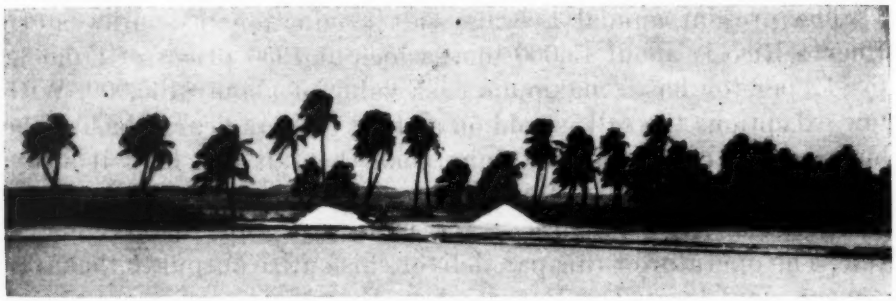

FIG. 5. Salt stored in the open air. The view is across one of the pans in which evaporation is in progress. Photograph taken along the west coast of southwestern Puerto Rico near *Laguna* Rincon.

addition, it appears highly probable that this area could supply refined salt for table use. At the present time most of the refined salt is imported from the United States, but with easily developed purification techniques the Puerto Ricans could probably take over most of this market. Further demands for salt can be foreseen as the cattle industry of the island continues to expand. The needs of manufacturers can be supplied as indicated by the sale of salt from one of the pans to the Ponce cement plant. Increasing industrial activity in Puerto Rico foretells an increasing salt demand, which can easily be met by the salt pan operators. The recent opening of one pan in southwestern Puerto Rico, and the increased emphasis placed on salt production in some of the old pans indicates the increasing importance of the industry. Enlarging markets, small capital investments, low maintenance costs, cheap labor and fairly high profits encourage continued expansion.

SOURCE UNIT FOR THIRD GRADE COMMUNITY GEOGRAPHY

PAULINE SCHLECHTY
South Side School, Whiting, Indiana

Geography, as the term is used in a broad sense, in the curriculum of the elementary grades deals with the relation of man and his environment. Geography, then, is a living subject being taught to active, living children. Keeping this in mind to accomplish the desired results, the teacher must have an active, not static, program if the objectives are met and desired results accomplished.

To have an active and successful geography program the teacher must have her aims, goals and objectives clearly in mind and plan with the children, if possible, a desirable program in such a way that the result will be a satisfying experience to both the teacher and the children.

In curriculum planning today, the method used is to start with the child, where he is in his understanding and knowledge, and build from there. This means starting with the known and moving to the unknown. Consequently in the geography program the reasonable place to start with the child is in his home, his school and his community. These are the places and things familiar to him and that he can understand. Thus, the logical source unit to

introduce the young child to geography would be the "Home Community."

HOME GEOGRAPHY

I. Objectives.

A. General.

1. To develop an understanding and appreciation of a. the interrelationship of man and nature, b. the interdependence of people, c. the ability and desire to live and work together harmoniously, d. and broaden the child's interests in everyday things and in his environment thru geography and e. helping the child enlarge his geographic vocabulary, reading and understanding.

B. Specific.

1. To develop an understanding and appreciation of the home community as follows: a. child's role in the home community, b. community needs, c. community workers, d. community resources, e. community problems—how solved, f. conservation and g. wise use of the community.
2. Develop the understanding that a. the people of the community help supply one another's needs, b. man's basic needs are food, shelter and clothing, c. it is necessary for us to live in groups to help one another get food, shelter, clothing, recreation and education, d. all groups need products and culture of other communities, e. individuals are dependent upon other individuals and have responsibilities toward one another in the community and in the government, f. the history of the community is one of the factors which influences its ways of working and living, g. the physical features also are responsible for the history and kind of community it is and h. training for citizenship is a daily task at home, in school and in the community.

II. Content-material.

A. What makes a community?

1. People.

2. Resources.
3. Location.
4. Work.
5. Transportation.
6. Communication.

B. What are some community needs?

1. Stores—shopping center, banks, etc.
2. Community helpers—fireman, policeman, health department.
3. Schools.
4. Churches.
5. Recreation—parks, community center, movies.
6. Water facilities.
7. Industry.

C. How are the people fed?
D. How are they clothed?
E. What kind of homes do they live in?
F. How are homes lighted and heated?
G. Relationship to other communities.
H. Population of the community.
I. Own neighborhood.
J. Natural vegetation; kind of soil and water bodies.

III. Approaches—motivation.

This unit may be introduced in many ways. If based on some real experience either by an individual or by the entire group it will have much more meaning.

A. Possible realistic approaches are:

1. A new child moving into the community and entering our school.
2. A child going to another community to visit and report the experience to the class comparing and contrasting it to the home community.
3. Clean-up week in the spring.
4. Health week.

B. If the children do not bring up community problems on their own, the teacher has many ways in which she can do it, such as:

1. At the beginning of the school year discuss the homes from which each of the children comes. Then enlarge upon it by moving on to the school, then out into the community.
2. Thru the geography or social science textbook.
3. Thru some incident or community experience as a fire, damage done by storm to community, erection of new buildings or homes.

C. Other teacher-motivated method and materials are:

1. Reading, such as stories and factual materials—newspaper, textbook, Weekly Reader, magazines.
2. Collections brought in by children—pictures, things made in the community, etc. and by teacher.
3. Field trips—observation of a. own neighborhood, b. around the school, c. park, d. city buildings, e. fire station—police station, f. industries and g. library
4. Visual aids: a. films (movies, strip films), b. slides, c. pictures, d. diagrams, maps, charts, graphs, e. blackboard and f. models.

As with all approaches, motivations and materials, there must be a purpose for learning. Moreover, the teacher should be thoroly familiar with all materials and methods used. The unit should be well planned and organized by the teacher and the group. The teacher should know: where she is going with the group; why—the objectives and expected outcomes; how to attain expected results and results—summary and evaluation.

IV. Learning Activities—as related to the whole curriculum.

A. Reading.

1. Stories.
2. Textbook.
3. Newspapers (for children).
4. Magazines (for children).
5. Encyclopaedias.
6. Supplementary books—fact and fiction.
7. Reports.

The reading will be both fact and fiction. It should be read with a purpose and from several sources. The reading will

be done by both the children and the teacher to help the children gain knowledge and understanding as well as enjoyment when his interest is aroused. It will also be done to impart knowledge to others.

B. Observation (this will develop):

1. Purpose (to develop) a. a spirit of inquiry, b. recognition of likenesses and differences, c. an appreciation of others in making our community a better place in which to live and an understanding of each individual's responsibility in the community beginning in the home.

2. Methods: a. field trips, such as to park, around the school, city buildings, fire station, police station, stores on Main Street, own neighborhood, industries, library and water front. (Field trips need planning and guidance. The results are better if the children help make the plans and organize the trip. Every field trip should be purposeful and in line with the total objective of the unit.), b. films (movies and strip films), c. slides (observation should be made carefully and reported accurately) and art and handwork. These may include making booklets, scrap books, posters, slides, maps, charts, graphs, diagrams, puppets, models and painting and drawing any community scenes or activities and individual pictures or murals.

These activities again should only be used for a definite purpose and in the use of each summarize and evaluate the outcomes.

E. Language and Writing.

1. Written, as follows: a. reports, b. stories and c. poems. This can do much for the creative writing background. The writing may be fact or fancy.
2. Oral, in the following ways: a. reports, b. planning together, c. giving directions, d. stories and e. organization.

This can be a sharing of ideas. It can do much to help the child live and work in a democratic way.

F. Mathematics—arithmetic.

1. Making and reading maps.
2. Making and reading charts.
3. Measuring.
4. Counting.

This gives the child a purpose for learning how to manipulate and use his number language and knowledge as well as the ability to understand and appreciate the relationship of number values. (No geography learning is set off separately from all other learning activities. It is just one small part of the whole learning activities.)

G. Social Studies.

Geography largely makes up what is known as the social studies. Geography and history are interdependent; it is often difficult to have one without the other. To bring out the relationship of the effects of man on nature and nature on man as well as the relationship and dependence of man on man is the chief objective of the social studies. This is also the chief objective of geography even if studied alone.

One cannot very well work on the unit of Home Community without doing some history as well as geography because they are so interrelated and interdependent one upon the other.

H. Music.

1. Singing, such as: a. songs of workmen, b. transportation and c. home and family.
2. Rhythm, such as: a. hammer on the anvil, b. waves on the water and c. walking, running, etc., of the people.
3. Creative songs and movements by the children.

V. Culminating Activities.

It is always well to complete a unit by drawing all the work together to a focal point, letting the child appreciate and understand the work or project as a whole, what he as an individual has contributed and gotten out of it as well as what the group has done as a whole working together.

It is also an excellent way to develop a better group-school relationship and a school-home relationship. Parents are always interested in knowing what their children are doing, and there is no better way than by seeing some of the results of individual and group work. This may be done in several ways. A few suggestions:

A. A program which might include: a. dramatizing the history and development of the community, b. the school's place in the community, c. community workers and helpers, d. how we, the children, can help make a better community and e. good citizenship.

B. An exhibit of: a. drawings, paintings, maps, etc., b. constructed projects and c. scrapbooks containing pictures, stories etc. of the community.

C. Movies: a. of own community and b. of other communities.

D. Have different people of the community talk to the children and parents, such as: a. policeman, b. fireman, c. doctor, d. dentist, e. nurse, f. mayor, g. school superintendent, h. an early settler in the community and i. industrial representative.

E. Test—variety of kinds to summarize and evaluate the unit.

VI. Evaluation.

Evaluation should be done for evidences of growth, not an arbitrary criticism. It should be a check of the objectives to see if they were accomplished.

A. Some points for consideration in the teacher's evaluation are:[1]

1. Did the children enjoy the experiences?
2. Was there a growth of meaningful understanding and appreciation of the importance of the community in the life of man. The interrelationship of man and his environment and of men and his fellow men?

[1] Let the children help in evaluating by setting up standards of accomplishment for later use as criteria for evaluation.

3. Did this unit meet the child's needs of adaptation and relation of geography to his everyday living?
4. Did the child have pride in his accomplishment?
5. Did this cause the child to evaluate himself, his work, interests, growth, ability and responsibility for getting along with others in a harmonious way?
6. Was there a development of keen interest in the child's immediate environment?
7. Did the child develop a desire for further information?
8. Was the desire for further information stimulated?
9. Was there a keener power of observation developed?
10. Was the appreciation of value of first-hand experiences increased?
11. Was there a development of co-operation with others and tolerance toward them?
12. Were their ideas recognized and evaluated?
13. Did the child learn that living together and becoming good citizens was begun, fostered and developed in the home, the school and the community? (That communities are made up of individuals and each has his responsibility. A community is no better than each of the individuals who make up the community.)
14. Have the children developed an interest in and some understanding of both their physical and cultural environments?
15. Are the children aware of the interplay between elements of the physical environment and man's activities?

B. Teacher evaluation of herself and her accomplishments:

1. Were the objectives met?
2. Was there pupil interest? Did it grow?
3. Did each individual as well as the group participate?
4. Was there attention given to both individual and group needs?
5. Did the unit of work induce geographic thinking?
6. Was there interest and enthusiasm for the group and the individual? Was this interest sustained?
7. Was there an opportunity for pupil planning?

8. Was there good pupil-teacher relationship?
9. Was there adaptability of material to the ability of the group?

VII. Some suggestions for specific units growing out of the source unit.

A. Shopping in our community stores on Main Street.
B. Community recreation.
C. Our schools.
D. Our homes.
E. Our churches.
F. Where father works.
G. Pure water for our community.
H. Community helpers.
I. How our homes are heated.
J. Transportation in our community.

VIII. Some books for your reading table:

A. Poole, Barton, Baker Geography Foundation Series, *In Country and City* (Indianapolis: Bobbs-Merrill Company, 1952).
B. Mary Lusk Pierce, *The Community Where I Live* (Boston: Allyn and Bacon, 1952).
C. Wallace W. Atwood and Helen Goss Thomas, *Neighborhood Stories* (Chicago: Ginn and Company, 1950).
D. G. R. Bodley and E. L. Thurston, *Home Geography,* Iroquois Geography Series (Syracuse: Iroquois Publishing Company, 1945).
E. Gertrude Whipple and Preston E. James, *Our Earth,* Basal Geographies (New York: Macmillan Company, 1947).
F. Wallace R. McConnell and Laura Mengert Hugley, *Geography Around the Home,* The McConnell Geographies (Chicago: Rand McNally and Company, 1950).
G. Smith, Sorenson and Carls, *Our Neighbors at Home,* Our Neighbors Geography Series (Chicago: John C. Winston Co., 1947).
H. Eleanor Thomas, *Your Town and Mine,* Social Studies Series (Chicago: Ginn and Company, 1949).

(Usually a teacher's manual accompanies each textbook series.)

PALO DURO CANYON

WALLACE E. MCINTYRE
Illinois State Normal University

The Texas Panhandle is a land of great distances and wide open spaces. As a Texan friend once jokingly remarked, "You can travel farther and see less in Texas than in any other place I know of." To the casual traveler crossing the Panhandle region, this is perhaps more truth than poetry, and cars hurtle along Route 66 at a feverish pace, their drivers scarcely lifting their eyes from the pavement to observe the monotonous landscape on either side.

PANHANDLE LANDSCAPE

Nevertheless, should one wish to tarry awhile and take a few side roads, the Panhandle has several fascinating and interest-provoking attractions for both the casual tourist and the person of scientific bent. Here, in the breaks of the Canadian River, are found the easternmost discoveries of Pueblo Indian culture, and Coronado is reported to have wandered here on his great inland journey. This is a "type" region for several important fossil discoveries, altho relatively little has been done to follow up the paleontological wealth known to exist here. Historical lore of the Panhandle is rich with names of early exploring expeditions, famous cowboys of the like of Colonel Charles Goodnight, and such fabulous ranches as the JA, XIT, and the Matador. Growing industry, based on oil and our greatest natural gas field, is epitomized by the great Carbon Black manufacturing plants of Borger and Pampa, which darken the entire northern horizon and blacken the faces of "whitefaced" hereford cattle a hundred miles away. The Panhandle plains are now covered with great fields of sorghums and wheat, with well irrigation increasingly important in this region of low and uncertain rainfall.

Of these and other items of interest, probably the most unexpected and striking is a series of deep and colorful canyons. In particular, the headwaters of the Red River have created a maze of intricate erosional features. While most of these canyons are on private ranch lands, the major portion of the largest canyon has been set aside as Palo Duro State Park. An all-weather 11 mile blacktop highway connects Palo Duro with Canyon, a college town on U. S. Routes 60 and 87 about 20 miles south of Amarillo, Texas.

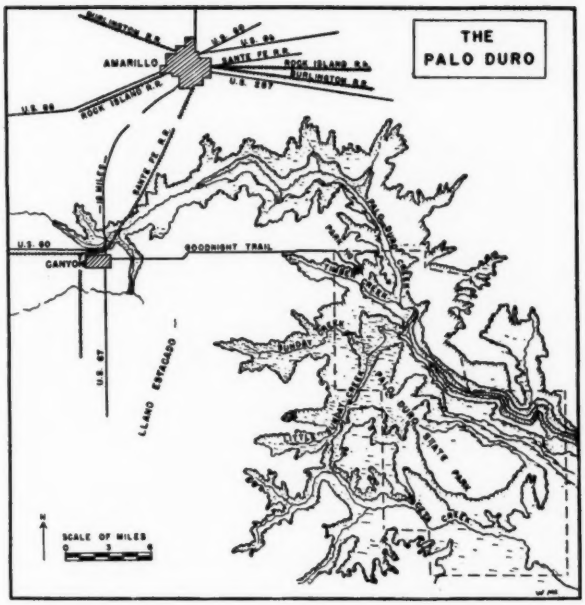

FIG. 1. Palo Duro Canyon lies a short distance off the main-travelled routes thru the Texas Panhandle. The major portion of the Canyon is now a state park.

Thus a quick and simple side trip from Route 66 may bring a refreshing bit of variety to the long journey across the plains (Fig. 1.)

As one drives eastward from the city of Canyon the landscape is typical of the high plains. On either side as far as the eye can see are gently undulating to level fields of sorghum and wheat, while here and there broad shallow "Buffalo Wallow" lakes dot the landscape. The skyline is perfectly level and seemingly endless. Gradually the fields of crops change to grazing land, and suddenly. right at one's feet, a giant crack appears to the right of the highway, branching and enlarging so rapidly into a maze of deep canyons as to catch the first-time visitor completely by surprise. From the lodge near the park entrance, there is a magnificant view down into the main canyon revealing a striking panorama of geological formations, variegated colors and winding stream courses far below which immediately tempt one's exploring instinct (Fig. 2).

After the initial surprise a feeling of perplexity arises as to the logical explanation and story behind the presence of such unexpected canyons in a region noted for its flatness. However, the

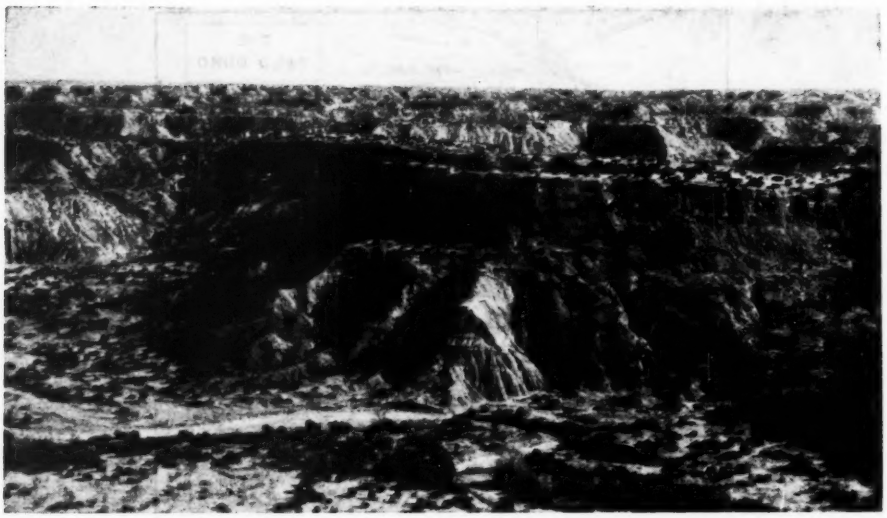

FIG. 2. Skylines reveal the monotonous flatness of the Llano Estacado. Here its eastern border is locally dissected by headwaters of the Red River. Spurs in the foreground are "Spanish Skirts," resembling the many-hued flowing gowns of Spanish dancers.

answer isn't very difficult for those who can read the story of the rocks.

ORIGIN OF THE PALO DURO

Our great plains rise slowly and gradually from the Mississippi lowlands, not entirely as a steady ascent, but periodically by a series of more or less vertical rises forming escarpments which run roughly on a north-south line. Since these escarpments are obvious points of attack by erosion, they are irregular, and are broken in many places by the eastward flowing streams. Our highways, seeking the easy routes, invariably cross the escarpments at points well broken down by erosion so that few travelers realize their presence. The last of the escarpments is the greatest of them all. It runs from southern Texas up thru the central part of the Panhandle and northward with a western trend across the United States into Canada. Known by physiographers as the "Break of the Plains," this escarpment separates the High Plains or Llano Estacado from the lower plains to the east. Along Route 66, the escarpment is lost in the hills and badlands associated with the breaks of the Canadian River which cuts entirely thru the High Plains. Farther to the south, the escarpment stands up more clearly and boldly as a cliff-like feature being worn back in irregular indentations by the vari-

ous creeks and branches making up the headwaters of the Red River. The largest of these indentations is Palo Duro Canyon with its many tributary canyons.

One of the chief attractions of the Palo Duro is the presence of striking color combinations from the green of vegetation, which contrasts so noticeably with the dry ranch lands above, to the many-hued walls of the canyons, all mellowed by a purplish haze which obscures and softens the angular rock formations in the distance. The lower layers of rock are brick-red sediments deposited in an ancient Permian sea some 200,000,000 years ago. When the sea withdrew it left behind a desert region with saline lakes. Layers of gypsum and salt were formed by preciptation from these lakes. After the dry winter season, stream courses are streaked with white and canyon walls are covered with a fluffy powder because of the evaporation of gypsum impregnated ground water which seeps thru the rock, or rises by capillary action.

In upper Triassic times, about 130,000,000 years ago, sediment was again spread out upon the region, mainly as river deposits over wide flood plains. The Triassic rocks cropping out in the Palo Duro Cliffs consist of two formations, the lower one being mainly colored shales. The first zone is typically white, gray, or lavender;

FIG. 3. The Kneeling Camel is one of many striking examples of interesting erosional features. Caves, fossils, Indian and cowboy relics arouse professional as well as amateur interests in the tributary canyons.

the next zone is a maroon or wine color, followed by a light yellow or sulphur yellow zone. Above this is a magenta-colored shale. Such a combination directly above the brick-red Permian rocks results in a veritable rainbow of colors. These striking formations are found over the entire canyon, and are called Spanish Skirts, resembling the flowing skirts worn by Spanish dancers. The upper formation includes sandstone layers which are resistant rocks, weathering into pedestal forms capping the softer shales. Striking examples are the Kneeling Camel, Devils Tombstone and the Lighthouse (Fig. 3).

After the Triassic, a gap of millions of years exists in the record of the rocks. Finally in the Pliocene period of the Cenozoic or Age of Mammals, a series of light colored beds were spread out over the more colorful earlier rocks by streams that flowed eastward from the Sangre de Christo and Sierra Grande mountain areas of New Mexico. Huge alluvial fans were built outward until they produced the broad apron on top of the Triassic rocks. Wind sorted and redeposited finer materials to produce loess and silt. Showers of volcanic ash contributed some of the finer sediments. All this in turn gives way to the white cap rock of the Pleistocene or Recent period.

Present streams carry far less water than in the Pliocene and Pleistocene epochs, so that sediment is no longer being carried out from the mountains to the High Plains. As further evidence of increased aridity, the surface strata are now cemented by soluble caleche and other forms of calcium carbonate to establish a hard cap rock, so that the strata form steep escarpments and canyon walls.

A large valley, that of the Pecos River, has been eroded headward along the flanks of the westward mountains with the result that the Llano Estacado is now separated from its original source of materials, and is being slowly cut away. The great escarpment and associated canyons mark the present eastern boundary of this gradual retreat.

Today, Palo Duro Canyon graphically portrays the work of nature over millions of years. The canyon floor is now 1120 feet below the level of the High plains. It is 20 miles across at its widest point with an entire length of 120 miles. For the hurried or less actively inclined visitor, a black top road constructed in 1951, winds down into and thru the main canyon for about 15 miles,

crossing and recrossing innocent looking Palo Duro Creek. This tiny stream, rising to flash flood heights, has been known to tear out great cottonwoods and remove large sections of the highway, illustrating the never ending attack which has created the canyon itself. However, the most interesting features are in the numerous side canyons, reached mainly by hiking trails and bridal paths. The "natives" invariably insist that the smaller tributary canyons are far more interesting than the main canyons, for they are much richer in detail of erosional sculpture, caves, minerals, fossils and other interesting discoveries.

CANYON FEATURES

The early cowboy, driving out the buffalo and Indians, chose the lower canyons for his first ranch sites in order to take advantage of the more plentiful water, protection from the still dangerous "Norther" blizzards in winter, and supplies of cedar timber for building. For much the same reason, a considerable amount of smaller wildlife inhabit the canyons today. The deer, coyote, badger, prairie dog and raccoon are still seen there, while the jack rabbit, friendly horned toad and less friendly scorpions, lizards, and rattlesnakes are commonly observed. Supposedly some 200 species of birdlife, including the golden eagle, owls, roadrunners, quail, mocking bird and mourning doves are found in the canyon. In summer, the fresh green of canyon vegetation is a striking contrast to the parched grasslands above. Here, cedars and cottonwoods provide a welcome shade, while mesquite, chinaberry and sage brush add to the list of native plants. Many blooming cacti, the beautiful yucca and almost the entire list of southwestern wildflowers add striking colors in their season to the already colorful scene.

Coronado's trail, old cowboy line camps and Indian camp and battle sites contribute to the points of interest that one may wish to explore.

The deep erosion of the canyons has revealed, too, the story of ancient life in the Panhandle, for a wealth of fossil life has been exposed. At one point on the Harrell Ranch, the ground is littered with fragments of fossils. During W.P.A. days, a large crew was hired to excavate several sites, uncovering many specimens, some of which can now be seen in the Southwest Plains Historical Museum at Canyon, Texas. From Triassic rocks have come Phyto-

sauria, dinosaurs, Parasuchians (crocodiles), amphibians (Stegocephalia) and a fish (Ceratodus dorotheae). In the overlying Pliocene and Pleistocene formations, a host of mammals, such as the mastodon, camel, pig, ancestral horse, sloth, saber-toothed tiger and others have been discovered.*

Facilities in the park are limited, consisting mainly of Coronado Lodge near the entrance. Here is the usual curio shop where one can also obtain sandwiches, information as to road conditions, maps, directions to interesting points and saddle horses. There are a few cabins, but it is better to plan on using the tourist courts in Canyon or Amarillo. Picnic spots are present, especially at the first crossing of Palo Duro Creek, but in general there is little development in this way. For the persons with trailer or tent who like to rough it, there is ample room and privacy but tap water, lavatories and similar luxuries are not provided, and one is free to choose his own campsite.

Palo Duro is a fascinating page in the great book of nature, and, combined with a visit to the Historical Museum in Canyon, is well worth the time of tourist and scientist alike.

* Geological information taken from E. Sellards, W. Adkins and F. Plummer, *The Geology of Texas* (Austin, Texas: University of Texas Bulletin No. 3232, August 22, 1932).

GEOGRAPHICAL PUBLICATIONS

Boies Penrose, **Travel and Discovery in the Renaissance, 1420-1620.** Harvard University Press, 1952. 369 pages. XVII. $5.00.

The Great Discoveries of the fifteenth and sixteenth centuries already form the subject of a vast literature. To add to it would seem an act of supererogation if Mr. Penrose had not produced a work of condensation of the highest order. After a brief review of the background in classical and medieval thought, the author starts in with the Portuguese explorers and traders; follows this with an account of the Spanish in the New World, and then of the French, English and Dutch in the several regions of the world in which they explored, traded and settled. In all this, Mr. Penrose preserves a judicious balance. The book, short as it is, is not merely a record of the famous names in exploration. These are seen as but the brighter stars in a vast galaxy. It is this balance between the greater and the lesser figures in the history of exploration that this reviewer admires most. Not all would accept his judgment regarding, for example, the voyages of Vespucci, but none can question that he has given us an admirable outline of the events of this period.

Mr. Penrose concludes his book with two chapters on cartography and navigation and on geographical literature during the period. These may be of the greatest interest and value to the student. In these he not only sets the voyagers against a background of their technical equipment, but also gives us a broad survey of the writings of the travelers themselves and of those scholars and men of affairs who, from the safety of their studies, watched their progress and measured their achievement.

NORMAN J. G. POUNDS

Indiana University

Lewis F. Thomas and Robert M. Crisler. **A Manual of the Economic Geography of the United States.** Educational Publishers, Inc., Saint Louis, 1953. $4.00.

The authors of this manual go on the assumption that the sum total of the geography of the trade centers of the United States is equal to the Geography of the United States. They accordingly make little effort to correlate information of various sections. The manual, however, merits the close inspection of any student of Economic Geography or the Geography of the United States. By nature this work is a convenient reference, and it is difficult for this reviewer to see how it could usefully serve a textbook function (altho it is used as a text at Washington University, St. Louis). The manual is encyclopedic in character, and this limits its classroom usefulness, but the variety of useful geographic information included under one cover makes it a most convenient reference for student or professor.

Fortunately the manual has many good features and only a few bad ones. The manual is well organized. It follows a logical understandable sequence. Information on population, industries and transportation is given for 52 trade centers of the United States. Maps are included which show the boundaries of the trade centers as well as the various geographic regions of the United States.

The 18-page bibliography at the end of the manual is especially useful. The bibliography is divided into two main parts—the first part is made up of general references on the United States as a whole, while the second part is devoted to shorter periodical articles which relate to each of the trade centers. The articles in the bibliography have been taken from the JOURNAL OF GEOGRAPHY, *Economic Geography, Annals of the Association of American Geographers, Geographical Review* and the city series from *Satur-*

day Evening Post. The articles cited in the bibliography are all relatively timely, since they have all been written since 1940.

The principal disadvantage of the manual in the opinion of this reviewer is the lack of legibility of many of the maps. Regional lines seem to merge with state boundaries, drainage patterns, county lines and trade center boundaries. Much of this confusion could be eliminated by better cartographic work.

ARTHUR H. DOERR

University of Oklahoma

Gustav L. Fletcher and Caleb W. Wolfe, **Earth Science,** Third Edition, D. C. Heath and Company, Boston, 1953, 556 pages, $3.60.

This new, revised volume of *Earth Science* is a high school text designed to give a broad coverage of the physical elements of geography. Written in an easy to read style and simple language "the book is organized to fit a sequence of topics successfully followed in teaching many classes in earth science."

The book contains 34 chapters, the first 18 of which treat the physical landscape and the tectonic and gradational forces by which it has been developed. The following 12 chapters deal with the earth and its planetary relations, latitude and longitude, time, the earth's atmosphere, weather and climate. This is followed by three chapters on the sea and its work, along with shorelines and harbors. A section of the Appendix is concerned with maps and map projections, terrestrial magnetism and the compass. Adding to the value of the text is a concluding chapter on the conservation of resources.

The text is printed in two sizes of type. The authors state that "the larger sized type may be considered the minimum course," while the faster, more advanced students can profitably use the material set in smaller type, and marked with a star.

Each chapter is followed by a completion summary and exercises, while 11 pages of the Appendix are devoted to general review questions adapted from the New York State Regents Examinations.

The book is well illustrated with photographs, charts, and diagrams.

Combining detail, accuracy, and simplicity, this volume ranks high as a high school text on physical geography.

BENJAMIN F. RICHASON, JR.

Carroll College
Waukesha, Wisconsin

Weaver and Lukermann. **World Resource Statistics.** Burgess Publishing Company, Minneapolis, Minnesota. 184 pages with 2 maps and graph paper. $4.00.

One of the handicaps to the promotion of Economic Geography in the high school and to the teaching of geography at the college level is the constant changes in statistics. A newly revised edition, *World Resource Statistics,* provides the student and teacher with a compendium as timely as available records, extensive research and exacting compilation makes possible. The authors have left blank columns for the addition of new statistics as they become available.

World Resource Statistics is a revision of a volume entitled *A World Statistical Survey of Commercial Production* published three years ago.

Major tables are revised with 1950 census figures. Many additional new sections and extensive new tables make this volume superior to the original. This book will save hours of time for any teacher who wants to keep his data up to date.

Dr. R. W. Eschmeyer, **Charley Cottontail.** Fisherman Press, Inc. Oxford, Ohio, 1952. 50 pages, 41 illustrations. $.50 paper bound, $1.50 Clothbound.

Dr. R. W. Eschmeyer, **Bobby Bluegill.** Fisherman Press, Inc. Oxford, Ohio, 1952. 47 pages, 31 illustrations. $.50 paper bound, $1.50 Clothbound.

Both of these true-to-life stories present educational information in an entertaining and enjoyable manner. The plots are filled with excitement and suspense.

Descriptions thruout the books are not only accurate and detailed but also would encourage children to raise questions that would lead to new ideas and interests. Protective adaptations of wild animals are explained. The living habits of wild animals are worked into the stories in a very natural, matter-of-fact way.

Because the author was anxious to include as much conversation information as possible in his story, some incidents tend to move away from the plot which might make it difficult for some children in understanding the main story.

Some of the descriptions of natural elimination such as the rabbits drowning due to an overflowing creek are not necessary for the main story. Young children would become disturbed over these incidents altho intermediate grade children might be better able to accept these incidents as natural and necessary conditions for wildlife.

The feeling that the heroes of the stories will always escape the sad fates that befall other members of their kind might detract from the interests of the story for some children.

Charley Cottontail describes the activities of a rabbit from birth thru adulthood. tho given a name like "Charley," he is by no means an animated cartoon character. This rabbit lives and behaves like a real rabbit. He eats clover, runs from his enemies and soon forgets his mistakes. Bob, the farm boy shows how a farm should be kept if wild animals are to thrive on the farm. He also shows the need of natural enemies in order to keep the number of rabbits at a more constant level.

Bobby Bluegill is one of over 500,000 fish living in a farm pond. The book includes an interesting description of the nests of fish and the size of fish when first hatched. As in the story of *Charley Cottontail, Bobby Bluegill* makes an impressive plea for sensible conservation—including the retention of natural enemies to help maintain an adequate, healthy, full-grown crop of fish. This is dramatically pointed up in the story of the farm pond being seined of extra bluegill in an effort to balance the fish in the pond. The change this activity makes in Bobby's size is quite impressive. Thru this story one sees the value of outdoor sports and outdoor living to people in need of relaxation and recreation.

Both of these books are valuable reading because of their attempt to present a middle-of-the-road conservation policy. The author also shows the advantages of co-operation between farmer and conservation agents.

The vocabulary and concepts in these books would place them at a five-eight grade level tho excerpts could be read to younger children.

Charley Cottontail and *Bobby Bluegill* are excellent reference books for elementary teachers who are interested in teaching conservation.

RUTH SUGARMAN

New York State College for Teachers
at Buffalo

Educators Guide to Free Slidefilms—Fifth Annual Edition. Educators Progress Service, Randolph, Wisconsin, 1953. v and 185 pages. $6.00.

The 1953 or Fifth Annual Edition of the *Educators Guide to Free Slidefilms,*

published by the Educators Progress Service of Randolph, Wisconsin, has done an outstanding job of compiling a list of free film strips providing excellent material for use with many types of groups and for considerable and varied purposes.

Of the 621 titles, 37 of the film strips may be retained permanently. The remaining films may be had by paying postage one way.

Five specific types of agencies, representing 72 different sources, are responsible for this fine service. These agencies are: 1. Government agencies, 2. Industrial and commercial groups, 3. Foreign governments, 4. Non-profit organizations and 5. Philanthropic organizations.

Propaganada and advertising are at a definite minimum in the strips seen to-date.

The geography teacher should be interested in the 57 slide films on geography; many have accompanying sound records. If you cannot use the record, script will accompany several of the various subjects upon request.

Another feature of the guide and available filmstrips is the significance of the value of cross references. This can be illustrated in using the 55 slide films listed under Social-Studies—Geography with the title, Natural Resources: Key to America's Strength in conjunction with other subject films such as: The Firebug—Safety, Story of West Coast Lumber—Science, Field Chopping—Agriculture, More From Your Manure—Agriculture and History of Wool—Home Economics.

Sources, titles, subjects, time, types and availability of film are all treated in the *Educators Guide*. It is very important that under availability the majority of agencies state that they "can fill all requests," thus bringing correct valuable, functional and comprehensive information on slides and slidefilms to your classroom.

ARTHUR GRUNDY

State Teachers College
Shippensburg, Pennsylvania

Arthur H. Robinson. **Elements of Cartography.** John Wiley & Sons, Inc., New York, 1953. vii and 254 pages. $7.00.

Occasionally books are published which admirably meet an urgent need. This is one. Fundamental concepts pertaining to the derivation, production and use of maps are lucidly presented. This is fortunate, especially since many of the concepts are, or should be, a *must* for every geography students.

Arthur K. Robinson states in his preface that the "book is primarily designed as a textbook for a first course in cartography for graduate and undergraduate students majoring in geography or allied social and natural sciences." We hasten to add that it is also a valuable source book for teachers and students in those colleges in which the art, science and mechanics of cartography must of necessity be taught as an auxiliary element of geography courses other than cartography.

Map projections, reproduction, design, lettering, symbolization and terrain representation are the key items discussed.

The clarity of the text is a prime virtue of the book. In general, it is very well illustrated. If something negative must be said, it is this—it is unfortunate that publishers do not find it possible to illustrate such a superior presentation with color, especially since in many instances color is such an integral part of maps.

HERBERT H. GROSS

Concordia Teachers College
River Forest, Illinois

Hugh J. Schonfield. **The Suez Canal in World Affairs.** Philosophical Library, New York, 1952. 175 pages, illustrations. $4.50.

"The Suez Canal in World Affairs" is a concise, well-documented, case history of

the political, economic and military forces that world powers have brought to bear on a geopolitical problem of 4000 years standing—The Suez Canal. This study is of especial importance and timeliness to American students and teachers in that it appears possible the United States will intercede in the current British-Egyptian impasse.

The author traces the canal's development from the days of the Pharaohs, when the idea of a canal across the isthmus of Suez was first conceived, down thru the planning (and scheming), constructing and operating stages of the present canal. The writer highlights the work of Ferdinand de Lesseps, the formation of the Canal Company and the actual construction and operation of the canal. Operational phases receiving especial treatment are: 1. the opening of the canal, 2. World War I, 3. Italy's colonial experiments in Africa, 4. World War II and 5. post World War II negotiations between Great Britain and Egypt. The book is a handy source of statistical data and appended are extracts of pertinent charters, concessions, texts of conventions, records of treaties and traffic data.

The greatest contribution made by the author lies in the fact that he has given us a clear exposition of many of the complex and diverse ramifications of the Suez problem. As shown in the text these ramifications include many facets of military, political, economic, religious, racial and geographical factors as juggled by the personalities involved. While the treatment of most of these factors is excellent, particularly the military and political aspects, there are some shortcomings in that the author assumes that his potential readers possess the requisite background knowledge of the spatial relationships involved and that they are also cognizant of the real commercial advantages afforded by the waterway. This notwithstanding, it should be emphasized that the author has shed much light on a problem that has been neglected in American texts; and, in addition, the study has outstanding value in view of the strategic importance of the Suez Canal in the world today.

J. EDWIN BECHT

Office of Assistant Chief of Staff, G-2
U.S. Army

Hammond's **Comparative World Atlas,** Desk Edition. Edited by Erwin Raisz. C. S. Hammond and Co., 1953. **$0.50.**

This atlas is of value because the low price of fifty cents per copy places it within the range of all students in grade school, high school and college.

It has a gazetteer-index of the world at the front of the book for easy use. World maps showing religions, languages, accessibility, occupations and political associations are listed in black and white.

There are 47 colored maps of continents and countries showing political, physical, population, vegetation, rainfall and temperature. These are maps that one would expect in a much more expensive atlas. The maps are prepared by one of the outstanding cartographers in the United States, Edwin Raisz.

This atlas is especially recommended for beginning classes in geography where the students need to carry the atlas to class each day.

E. EMERSON HALL

Mississippi Southern College

EDITORIAL NOTES AND NEWS

A 1952 edition of "The Oil Producing Industry in Your State," containing statistics, maps, charts and illustrations on each of 27 producing states is available (one copy free to teachers) from IPAA Information Service, Box 1019, Tulsa, Oklahoma. Additional copies are 1 dollar.

"Class Tested Filmstrips," the new and up-to-date catalog of Jam Handy filmstrips is now being released by The JAM HANDY Organization. Completely revised and listing every available filmstrip in color or black-and-white produced by The Jam Handy Studios, including the latest releases, the catalog is designed to help teachers in their selection of visual aids. The catalog is free and available upon request from The Jam Handy Organization School Service Department, 2821 East Grand Blvd., Detroit 11, Michigan.

Have you seen the revision of the 1939 edition of Lake Series No. 1, on the port of Buffalo, New York, with the inclusion of data on the port of Erie, Pennsylvania, as announced by the Board of Engineers for Rivers and Harbors, Corps of Engineers, Department of the Army?

A new chapter of Gamma Theta Upsilon has been established at the University of Colorado. Mr. Julius S. Toth is the sponsor. Prior to the establishment of this chapter, the most recent one was the Alpha Chi on the Mexico City College campus, Mexico City, D.F. Its sponsor is Dr. Jorge A. Vivo-Escoto.

The Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D.C., has prepared the following new SCS publications for the teaching of conservation: "Let's Save Soil with Sam and Sue" and "The Soil that Went to Town" for elementary grades and "Technical Skill for Soil and Water Conservation" and "The Measure of Our Land" for high school level.

According to the Twentieth Century Fund, among farm machines that have made the most rapid and sweeping changes in reducing farm employment are the Great Plains wheat combines, the sugar beet harvester and the mechanical cotton picker.

The Department of State, U.S.A., has recently announced a new periodical entitled *Field Reporter*. This new magazine will appear every second month. It will report, directly from the field, the activities of the increasing number of Americans, who are helping peoples thruout the world to fight a common battle against hunger, disease, ignorance and oppression. Subscriptions to *Field Reporter* may be placed with the Superintendent of Documents, Government Printing Office, Washington 25, D.C. The price is $1.50 for a domestic subscription and $2.00 for a foreign subscription.